Overview

The Transportation Analysis and Simulation System, or TRANSIMS, is an integrated system of travel forecasting models designed to give transportation planners accurate, complete information on traffic impacts, congestion, and pollution. Los Alamos National Laboratory is leading this effort to develop new transportation and air quality forecasting procedures required by the Clean Air Act, the Intermodal Surface Transportation Efficiency Act, and other regulations. It is part of the Travel Model Improvement Program sponsored by the U.S. Department of Transportation, the Environmental Protection Agency, and the Department of Energy.

TRANSIMS models create a virtual metropolitan region with a complete representation of the region's individuals, their activities, and the transportation infrastructure. Trips are planned to satisfy the individuals' activity patterns. TRANSIMS then simulates the movement of individuals across the transportation network, including their use of vehicles such as cars or buses, on a second-by-second basis. This virtual world of travelers mimics the traveling and driving behavior of real people in the region. The interactions of individual vehicles produce realistic traffic dynamics from which analysts using TRANSIMS can estimate vehicle emissions and judge the overall performance of the transportation system.

Previous transportation planning surveyed people about elements of their trips such as origins, destinations, routes, timing, and forms of transportation used, or modes. TRANSIMS starts with data about people's activities and the trips they take to carry out those activities, then builds a model of household and activity demand. The model forecasts how changes in transportation policy or infrastructure might affect those activities and trips. TRANSIMS tries to capture every important interaction between travel subsystems, such as an individual's activity plans and congestion on the transportation system. For instance, when a trip takes too long, people find other routes, change from car to bus or vice versa, leave at different times, or decide not to do a given activity at a given location.

Also, because TRANSIMS tracks individual travelers — locations, routes, modes taken, and how well their travel plans are executed — it can evaluate transportation alternatives and reliability to determine who might benefit and who might be adversely affected by transportation changes.

Los Alamos has done major studies of Albuquerque and Dallas transportation and completed a microsimulation of auto traffic patterns in 25 square miles of Dallas that represented about 200,000 vehicles over a five-hour period. A TRANSIMS model of Portland transportation is under development and scheduled for completion in 2000. The Portland study focuses on forecasting activity demand and predicting trips that use multiple modes of transportation. The goal of TRANSIMS is to develop technologies that can be used by transportation planners in any urban environment.

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